

March 13, 1959

Mr. Richard O. Boyer  
Physicians News Service Incorporated  
130 East 59th Street  
New York 22, New York

Dear Mr. Boyer:

To yours of February 19th:

A considered reply to your penetrating questions could fill several volumes but I will try to touch on just a few points. Barring some brilliant stroke of insight, we are probably many years away from systematic, clinical application of the new knowledge of mechanisms of genetic transfer. The obvious point of application would be to restore biochemical defects of genetic origin and offhand it would seem to be a simpler proposition to transplant whole cells and tissues from competent donors rather than isolated genes. In the development of transplantation technique itself, however, genetic transfer is bound to play an important role at least in the analytical stages and possibly in the actual perfected technique of transplantation from one individual to another. As you know, genetic individuality is reflected in a rather embarrassing way, as far as the surgeon is concerned, by virtue of the immunological rejection of foreign tissue by the normal host. Experimental designs similar to those used in the study of micro-organisms are bound to play an important role in the solution of basic problems of transplantation. I suppose there is a remote possibility that the transduction of genes may ultimately prove to be as feasible or perhaps even more so than the transplantation of whole, competent cells. It is important to point out, however, that these phenomena have so far been detected only in micro-organisms. and several laboratories are busily trying to extend their application to the somatic cells of higher organisms.

Until we have learned how to influence the genetic constitution of every single cell, it is doubtful whether transduction will furnish a direct approach to cancer therapy, since unmodified cells would continue the progress of the disease. This may be an open question for the future; meanwhile genetic analysis again may be expected to be an indispensable part of the understanding of the mechanism of cancer. The enclosed publications may help bring out this point.

A great many constitutional diseases are beginning to be understood as having at least some basis in a genetic defect in enzyme production. Apart from such conditions as diabetes and hypothyroidism, whose biochemical basis is perhaps more obvious, there are many workers who are hopeful that mental disease may be approachable from a similar standpoint. The most direct application of this concept, of restoration of defect by actually supplying the enzyme, may perhaps be found in Dr. Pauling's work. As I understand you will be interviewing him, there may be little point in my expanding this theme.

In brief, the clinical application of biochemical genetics may, in part, have to wait upon the development of new techniques of handling of somatic tissue cells with the same facility as is now possible for micro-organisms. Meanwhile, biochemical genetics has given a remarkable theoretical insight into a large number of otherwise obscure conditions.

Yours sincerely,

Joshua Lederberg  
Professor of Genetics